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LIGHT FIXTURE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation in part patent application of U.S. Application Serial No. 29/094,329, titled "Light Fixture", filed 09/30/98 now U.S. Patent No. <sup>D, 417, 301</sup> 4.

FIELD OF THE INVENTION

The present invention relates generally to light fixtures and, more particularly, to light fixtures suitable for illuminating flat surfaces.

BACKGROUND OF THE INVENTION

Surface illuminating devices are well known. For example, light fixtures are used in museums to illustrate paintings and on highways to light up directional signs. In another common use, conventional light fixtures are utilized to illuminate outdoor advertising, found along highways and thoroughfares.

The well-known term "billboard" is often used for poster panels and bulletins. A typical bulletin is utilized to advertise printed or hand painted messages and is usually found in high density traffic locations. The bulletin typically has an area of 672 square feet, having a height of about 14 feet and a width of about 48 feet. Poster panels are smaller, with an area of about 300 square feet, a height of about 12 feet and a width of about 25 feet. A poster panel is typically about 6 feet high and approximately 12 feet wide, having an area of about 72 square feet. While this specification sets forth the present invention as it relates to bulletins, it will be recognized that the present invention has application to a variety of cases wherein it is desirable to illuminate a large flat surface. For convenience, the "billboard" will be used herein in reference to such surfaces.

In a many cases, billboards display graphic advertisements or public service messages and the boards are oriented so as to be seen by motorists and pedestrians passing them during travel. Typically, a billboard having a length of 48 feet is illuminated from below by four light fixtures equidistantly spaced

5 along a bottom surface of the board and separated from the board by about 4  
to six feet. An important desirable characteristic of billboard light fixtures is  
that, when spaced along the lower edge of a billboard, they provide uniform  
lighting to the board so that no dark spots or shadows occur across the surface  
thereof. This characteristic is generally not found in conventional billboard  
10 light fixtures.

It is not uncommon in a billboard lighting system, utilizing four light  
fixtures, for the billboard to have four islands of bright illumination with  
shadowed areas at the periphery of the islands and between the islands of  
light. The result is an illuminated billboard that is not esthetically attractive  
and which, in some respects, fails to convey the advertiser's message because  
of uneven illumination or shadows on the board.  
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Thus, there is a need for a light fixture, adapted for use in illuminating  
flat surfaces such as billboards, that can illuminate the surface in a generally  
uniform manner while substantially reducing shadowed areas.

In view of the environment in which the device is utilized, such a light  
fixture should have some weather resistant capabilities since it will be exposed  
to a variety of changing and, sometimes severe, weather conditions. It should  
be resistant to invasion by insects and other pests and it should be easily  
maintained and capable of being opened quickly and easily for bulb  
20 replacement and maintenance. In addition, the light fixture should have good  
aerodynamic characteristics so as to withstand high winds without damage.

Further, the fixture should not contribute to "light pollution" by  
scattering light away from the object being illuminated. Still further, the light  
fixture should have a low profile so that it would not draw the eye of the  
observer to itself but, instead, would induce the observer to look at the surface  
being illuminated.  
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In some cases, conventional light fixtures fail to satisfy the aforesaid  
criteria.

5 In view of the foregoing, there is a need for a light fixture having a low  
profile, readily accessible for repair and bulb replacement and aerodynamically  
shaped to help reduce wind damage. Desirably, such a light fixture could  
provide a broad spectrum of illumination over a flat surface so that, when used  
in combination with similar fixtures, a large billboard surface could be  
10 illuminated in a relatively uniform manner while substantially reducing light  
pollution.

Ideally, such a light fixture would be low in cost to manufacture, being  
constructed of readily available materials.

#### SUMMARY OF THE INVENTION

15 In accordance with the present invention, there is provided a light fixture  
having a base for housing a light producing source and a flat plate disposed  
within the base. The plate has a well formed in it, the well having light  
reflecting walls. A lamp socket is located in a light reflecting bottom wall of the  
well. A plurality of light reflecting elements is attached to the plate and a pair  
20 of light reflecting assemblies, one on either side of the well, is fixed to the plate.  
Each light reflecting assembly includes a plurality of light reflecting fins affixed  
to the plate and projecting at an angle away from the plate. A frame having a  
convex lens affixed thereto is hingedly attached to the base. A light shield is  
fixed to the frame for reducing dispersion of unwanted light.

25 The present invention affords several advantages. For example, the light  
reflecting elements, walls and fins cooperate to distribute light over a flat  
surface uniformly, in an efficient and effective manner. When a billboard is  
illuminated by the present invention, shadows and dark spots are substantially  
reduced and an aesthetically pleasing result is obtained.

30 The light fixture of the present invention is constructed of readily  
obtainable materials and it has a rugged construction for use in varying  
weather conditions. The provision of a light shield helps to reduce unwanted  
light pollution and, as a result, the fixture is usable in an urban environment.

5 In addition, the light fixture of the present invention is easy to install,  
mechanically simple, economical and easy to maintain and service.

Other aspects and advantages of the present invention will become  
apparent from the following detailed description, taken in conjunction with the  
accompanying drawings, illustrating by way of example the principles of the  
10 invention.

#### BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of the light fixture of the present invention  
showing the housing and lens assembly in separated relationship;

FIG. 2 is a top plan view of the light fixture;

15 FIG. 3 is a sectional view taken along the line 3 - 3 of FIG. 2;

FIG. 4 is a perspective view of the base of the light fixture showing some  
of the components thereof; and,

FIG. 5 is a schematic depiction of the right one half of a billboard  
showing photometric readings taken at various places on a billboard  
20 illuminated by four light fixtures of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, and more particularly to FIGS. 1 - 4  
thereof, there is shown the light fixture 10 of the present invention. The fixture  
10 includes a generally rectangular base 11, having a cover 15 connected by a  
25 hinge 17. The base 11 described and depicted herein is generally rectangular  
in plan view and, for convenience, it may be regarded as having front, back, left  
and right sides. It will be recognized that light fixtures having bases with other  
shapes, round or oval for example, are within the contemplation and scope of  
the present invention.

30 The cover 15 is fixed to the base 11 by means of latches 19, which  
engage hooks 21 on the cover 15. The cover 15 includes a frame 23 that  
surrounds and holds a conventional convex lens 25. A light shield 27, affixed  
to the frame 23, helps to prevent unwanted light scattering. The shield extends  
across a rear portion of the frame 23, and wraps partially along the sides of the

5 frame 23. The light shield 27 has a height approximately equal to the height of the lens 25.

The base 11 includes a right sidewall 33, a left sidewall 34, a front wall 25 and a rear wall 37. In the presently preferred embodiment, the walls are constructed of stamped aluminum. A knuckle assembly 41 extends from a  
 10 bottom wall 38 and includes a joint 43 and a pipe 45. The assembly 41 permits water tight and weatherproof access to the interior of the fixture 10 for provision of electrical lines. The joint 43 enables adjustment of the angle at which the light fixture 10 is oriented toward a billboard to be illuminated.

The base 11 includes a silicon gasket 29 which serves to provide a  
 15 weather tight seal when the cover 15 is closed and clamped against the base 11. A switch 46, located near the front of the light fixture 10, within the gasket 29, permits power to the fixture 10 to be turned off and on during routine maintenance and lamp replacement.

The base 11 includes a generally rectangular flat sheet aluminum plate  
 20 51. Brackets, such as the brackets 31, support the plate 51 which is fixed thereto in a conventional manner. A well 75 is formed in the plate 51. Defining the well 75 are a light reflecting front wall 76, a light reflecting rear wall 81, light reflecting left and right sidewalls 79 and 77, respectively, and a bottom wall 82. An opening 82a is formed in the bottom wall 82 for receipt of a  
 25 lamp socket 53 that, in turn receives a lamp L. Each one of the light reflecting walls defining the well 25 is of sheet aluminum construction. The walls 76, 77 and 79 are each generally trapezoidal in shape each having a foot portion 76a, 77a and 79a respectively, bent at about a right angle to the wall surface. The foot portions 76a, 77a and 79a are fixed to the plate 51, in a conventional  
 30 manner, by fastening means such as rivets 68. It will be noted that the rear wall 81 extends above the surface of the plate 51 and describes an angle B with the plate 51 of about 45°. The rear wall 81 is of sheet aluminum construction and generally trapezoidal in shape. The top edge of the wall 81 is truncated,

5 having portions on the left and right sides removed. The light reflecting surfaces of the light reflecting walls 76, 77, 79, 81 and 82 each have a polished mirror-like finish.

10 A light reflecting element 71, of sheet aluminum construction, is disposed forward of the well 75. The element 71 includes a short light reflecting vertical wall 71b that is fixed at a flange 71a by rivets 68 to the plate 51. With respect to the plate 51, the light reflecting element 71 slopes downwardly, toward the well 75, at an angle A of approximately 45°, to a flange 71c which is affixed by rivets 68 to the upper surface of the plate 51.

15 In a similar manner, at the rearward portion of the base 11, there is a light reflecting plate 73 that is also of sheet aluminum construction. The reflecting plate is fixed to the plate 51, at a flange 73b, by rivets 68. With respect to the plate 51, the reflecting plate 73 slopes away from the well 75 at an angle D of about 45°. The light reflecting surfaces of the light reflecting element 71 and the light reflecting plate 73 each have a polished mirror-like finish.

20 As mentioned, while the base 11 is generally rectangular in shape, other shaped bases are within the scope of the present invention. Although the shape of the base might change from one embodiment to another, the light fixture 10 may be regarded as being generally symmetrical about a line M which, as shown in FIGS. 2 and 4, divides, or bisects, the light fixture 10 into symmetrical halves. As the term is used herein, "bisects" means "to divide into two generally equal halves".

25 Lateral light reflecting assemblies 93 and 94 will now be considered, with reference to FIGS. 1-4. The lateral assemblies are disposed laterally of the bisecting line M with the assembly 93 on the right side and the assembly 94 on the left. Each one of the assemblies 93 and 94 includes three trapezoidal light reflecting fins. Each one of these fins is of sheet aluminum construction and each is fixed to the plate 51 by fastening means such as the rivets 68. It will be

5 understood that the light reflecting surfaces of each one of the trapezoidal fins have a polished mirror-like finish.

10 The light reflecting fins comprising the assembly 93 are the fins 55, 57 and 59. Each fin is affixed by rivets 68 to the plate 51 at flanges 55a, 57a and 59a, respectively. Similarly arrayed on the left side of the base 11 and comprising the assembly 94 are the fins 61, 63 and 65 having respectively flanges 61a, 63a and 65a fixed by rivets 68 to the plate 51.

15 Each one of the light reflecting fins 55, 57, 59, 61, 63 and 65 is canted slightly laterally away from the vertical with respect to the plate 51. In this regard, the fins 59 and 65 each describe an angle C (FIG.3) of between about 50° and 60° with a preferred angle of about 55°. The fins 57 and 63, with respect to a line perpendicular to the plate 51, each describe an angle E (FIG. 4) of between about 55° and 65° with a preferred angle of about 60°. The fins 55 and 61, with respect to a line perpendicular to the plate 51, each describe an angle F (FIG. 4) of between about 65° and 75° with a preferred angle of about 70°.

20 Each one of the fins in the lateral assemblies 93 and 94 is trapezoidal in shape and each one of a given assembly differs from the other two fins of the assembly. By way of example, the assembly 93 will now be discussed. It will be understood that the descriptions of the fins 55, 57 and 59 apply equally to their counterparts, the fins 61, 63 and 65, respectively, comprising the assembly 94.

25 The fin 55 is generally rectangular in shape and constructed of aluminum. It is attached to the reflector plate 51 at a flange 55a by means of rivets 68. The fin 55 and the flange 55a are aligned generally parallel to the right sidewall 33 of the base 11. It will be understood that if the base had a round or oval construction, the fin 55 and the flange 55a would be aligned generally parallel to a line bisecting the elements 71 and 73. The top surface of

5 the fin 55 is not squared but has a small wedged shaped portion removed at the forward portion of the fin.

10 The fin 57 is located between the fin 55 and the fin 59. The fin 57 includes a flange 57a fixed to the plate 51 by rivets 68. The fin 57 is trapezoidal in shape and the fin and the flange 57a are disposed at an angle of about 30° angle to the right sidewall 33 or at a similar angle to a line bisecting the elements 71 and 73. The fin 57 is also of aluminum construction, having a pair of parallel sides and a truncated top. The fin 57 extends laterally with respect to the fin 55, overlapping the fin 55.

15 The fin 59 is fixed, at a flange 59a, to the plate 51 by rivets 68. The fin 59 is disposed so as to describe the hypotenuse of a right triangle formed by the right sidewall 33 and the rear wall 37. Thus, the fin 59 and the flange 59a are disposed at an approximate 45° angle to the right sidewall 33 or at a similar angle to a line bisecting the elements 71 and 73. The fin 59 is also of aluminum construction. It has a generally rectangular shape having a pair of sidewalls 59a and 59b and a top wall 59c. The fin 59 extends laterally with respect to the fin 57, overlapping the fin 57.

20 In a presently preferred embodiment of the present invention, the bottom wall 38 slopes downwardly to help form a space 83, defined by the sidewalls 33 and 34, the bottom wall 38 and the front wall 35. The space 83 enables convenient storage of lamp wiring and ballast (neither shown), without substantially increasing the size of the light fixture 10.

The light fixture 10 is suitable for use with a variety of conventional lamps. In a presently preferred embodiment, the lamp L is a metal halide 400W lamp manufactured by Venture Lighting, Solon, Ohio.

30 In operation, the light fixture 10, by virtue of the plurality of highly polished fins and reflective surfaces, produces a uniform light over a large flat surface. For example, by reference to FIG. 5, there is shown schematically the right one half of a typical billboard B erected on a leg 101 and illuminated by



two light fixtures 10. Distances in feet from the bottom edge of the billboard B are shown along the vertical to the right of the billboard while distances in feet from the right edge of the billboard are shown in a horizontal display above the board. Typically, the billboard B has a height of about 14 feet and a width of about 48 feet. In tests performed on a billboard having such dimensions, four light fixtures 10 were disposed equidistantly along the lower edge of the billboard. Photometric values were measured at various places on the billboard B. The values obtained, in foot-candles, are shown in FIG. 5. Identical, symmetrical values were obtained on the left side (not shown) of the billboard B. It will be seen that light fell on all portions of the billboard B with general uniformity. The result obtained shows that dark spots and areas of darkness between light segments have been substantially eliminated.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, determined by the appended claims rather than by the foregoing description. All changes, which come within the meaning and range of equivalency of the claims, are to be embraced within their scope.